Early experience of endoscopic endonasal approach for craniopharyngiomas and comparison with supraorbital keyhole approach: a case series

Youngbeom Seo, MD, PhD[1], Yoon-Hee Choo, MD, PhD[2]

1Department of Neurosurgery, Yeungnam University Hospital, Yeungnam University College of Medicine, Daegu, Republic of Korea

2Department of Neurosurgery, Seoul St.Mary's Hostpital, The catholic University of Korea

Abstract

Objective: The endoscopic endonasal approach (EEA) has become one of the best surgical methods for treatment of craniopharyngiomas which located in the sellar or suprasellar region. Here, we present our early experience of EEA and compared with results of supraorbital keyhole approach.

Methods: Between 2021 and 2023, a total of 8 patients underwent surgical resection for craniopharyngiomas. Five patients underwent surgical resections using the EEA. The supraorbital keyhole approach was used in 3 patients. We retrospectively reviewed clinical and surgical outcomes in the first consecutive five patients with newly diagnosed craniopharyngioma compared with results of supraorbital keyhole approach. This cohort study comprised 7 male and 1 female patients. The median age was 47.5 years (range, 8-69).

Results: Gross total removal was performed in 6 of the 8 patients and subtotal tumor removal in 2 patients. GTR was achieved in 1 out of 3 patients in Supraorbital approach and in 3 out of 5 patients in EEA. In Supraorbital approach, the mean operation time was 226 minutes, whereas in EEA, it was 277 minutes. The mean tumor sizes were 22 mm and 29 mm, respectively. Visual function improved in 6 of 6 patients. Endocrine function worsened in 6 of 8 patients. The postoperative cerebrospinal fluid leakage occurred in 1 patient treated with EEA. All patients retained previous quality of life.

Conclusions: The extended endoscopic endonasal and supraorbital keyhole approaches provide minimally invasive access for craniopharyngiomas. These two keyhole approaches appear to be a safe and effective treatment modality for craniopharyngiomas. The optimal approach for a particular case should be based on tumor characteristics and surgeon's experience. A personalized, tailored approach to the individual tumor based on several factors is crucial. However, more cases and long-term follow-up outcomes are required to confirm the clinical efficacy of these keyhole approaches.

Introduction

- The endoscopic endonasal approach (EEA) has become one of the best surgical methods for treatment of craniopharyngiomas which located in the sellar or suprasellar region.
- Here, we present our early experience of EEA and compared with results of supraorbital keyhole approach.

Methods and Materials

- Between 2021 and 2023, a total of 8 patients underwent surgical resection for craniopharyngiomas.
  - **5 patients** underwent surgical resections using **the EEA**.
  - **3 patients** treated with **the supraorbital keyhole approach**.
- We retrospectively reviewed clinical and surgical outcomes in the first consecutive five patients with newly diagnosed craniopharyngioma compared with results of supraorbital keyhole approach.
- This cohort study comprised 7 male and 1 female patients.
- The median age was 47.5 years (range, 8-69).

Table 1. Clinical characteristics of patients treated with EEA and supraorbital approach

Case No.	Sex/Age	c/c	Surgery	Size (mm)	Type	Location
1	M/42	Visual disturbance	Supraorbital keyhole	19	Cystic	Sellar/suprasellar
2	M/8	visual disturbance	EEA	23	Cystic	Sellar/suprasellar
3	M/40	Visual disturbance	EEA	20	Mixed	suprasellar
4	M/69	Visual disturbance	EEA	20	Cystic	Sellar/suprasellar
5	M/68	Visual disturbance	Supraorbital keyhole	20	Mixed	Suprasellar
6	F/53	Cognitive fx. Impairment	Supraorbital keyhole	28	Mixed	Sellar/suprasellar
7	M/15	Short status	EEA	43	Mixed	Sellar/suprasellar
8	M/55	Confusion	EEA	41	Mixed	Sellar/suprasellar

Results

- **Gross total removal (GTR)** was performed in 6 of the 8 patients and subtotal tumor removal in 2 patients.
- **GTR was achieved in 1 out of 3 patients in Supraorbital approach** and **in 3 out of 5 patients in EEA.**
- **In Supraorbital approach, the mean operation time was 226 minutes, whereas in EEA, it was 277 minutes.**
- Visual function improved in 6 of 6 patients. Endocrine function worsened in 6 of 8 patients.
- The postoperative cerebrospinal fluid leakage occurred in 1 patient treated with EEA. All patients retained previous quality of life.

Table 2. Surgical outcomes of patients

No.	Surgery	Size (mm)	Extent of removal	Stalk preservation	Op time (min)	Pathology	Reconstruction	Complication
1	Supraorbital keyhole	19	NTR	Yes	220	Papillary CRP		
5	Supraorbital keyhole	20	GTR	No	180	Papillary CRP		
6	Supraorbital keyhole	28	NTR	No	280	Adamantinomatous CRP		
2	EEA	23	GTR	Yes	210	Adamantinomatous CRP	Tachosil+NSF +glue	
3	EEA	20	GTR	No	285	Papillary CRP	Tachosil+Hydroset +NSF	
4	EEA	20	GTR	No	270	Adamantinomatous CRP	Allograft+Tachosil +Hydroset+NSF	CSF leakage
7	EEA	43	NTR	No	380	Adamantinomatous CRP	Fat+tachosil +Hydroset+NSF	IVH
8	EEA	41	GTR	No	240	Adamantinomatous CRP	Fat+tachosil +Hydroset+NSF	

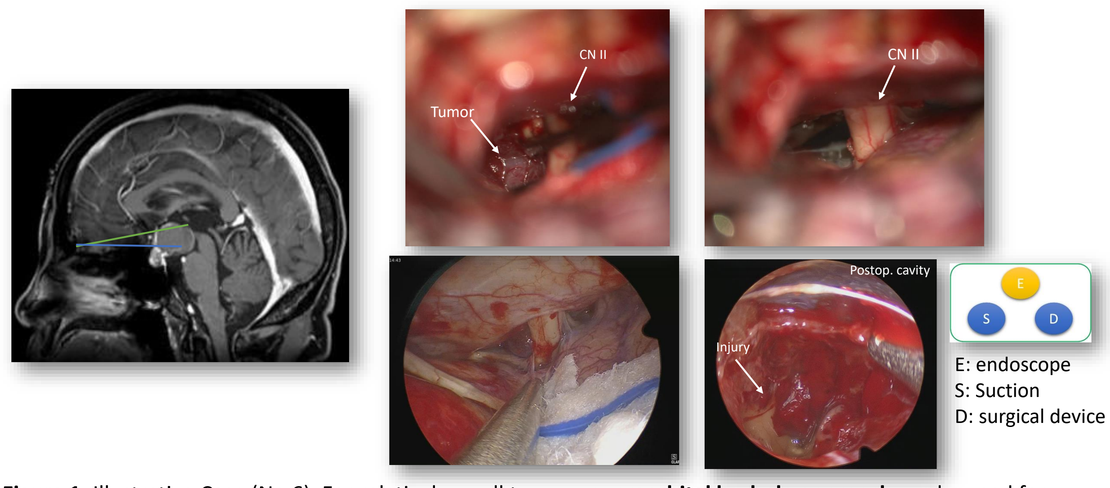

Figure 1. Illustrative Case (No 6). For relatively small tumors, **supraorbital keyhole approach** can be used for tumor removal. However, the limited surgical space presents challenges such as restricted visibility and reduced maneuverability. In such cases, inserting an endoscope can enhance the field of view, but the endoscope itself may further narrow the confined space.

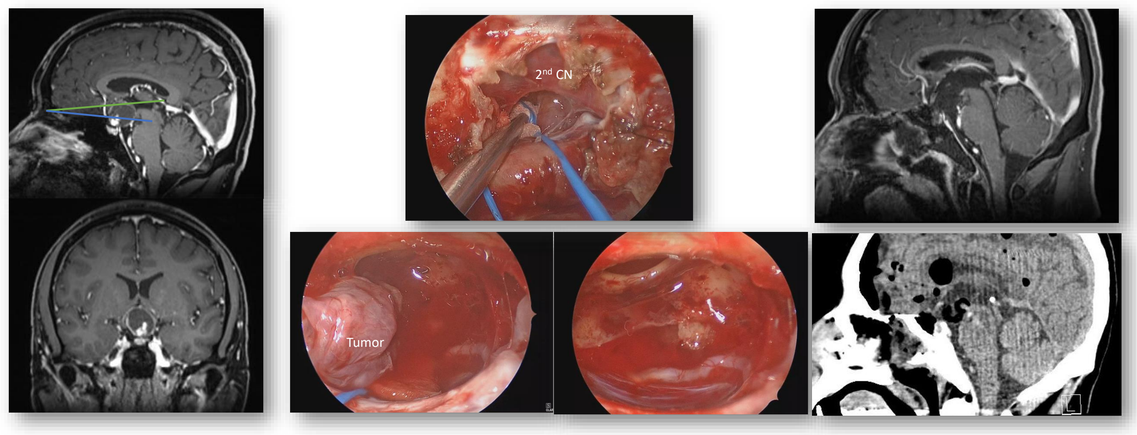

Figure 2. Illustrative Case (No 3). This patient presented with visual field defects as the chief complaint. Given the priority of preserving optic nerve function, an **endoscopic approach** was chosen. As shown in the intraoperative images, the tumor was removed from beneath the optic nerve, minimizing the risk of optic nerve injury. Additionally, the wide field of view helps reduce damage to the surrounding brain tissue.

Conclusions

- The extended endoscopic endonasal and supraorbital keyhole approaches provide minimally invasive access for craniopharyngiomas.
- These two keyhole approaches appear to be a safe and effective treatment modality for craniopharyngiomas.
- The optimal approach for a particular case should be based on tumor characteristics and surgeon's experience.
- A personalized, tailored approach to the individual tumor based on several factors is crucial.
- However, more cases and long-term follow-up outcomes are required to confirm the clinical efficacy of these keyhole approaches.

Contact

[name] Youngbeom Seo, MD, PhD
[organization] Yeungnam University Hospital, Yeungnam University College of Medicine
[address] 170, Hyeonchung-ro, Nam-gu, Daegu, 42415, Republic of Korea
[email] nsybseo@gmail.com/ nsybseo@yu.ac.kr
[phone] 82-53-620-3791

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